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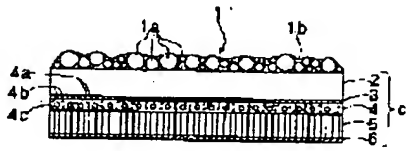
(54) EL ELEMENT FOR BACK LIGHT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a translucent scattering layer which excels in close adhesion property, has high transmissivity when light is emitted, is white when light is not emitted with high shielding property.
SOLUTION: A light emitting layer 4 formed by adding a pink pigment 4c so as to make blue-green color look white presents pink color when light is not emitted, but looks white by a translucent scattering layer 1. The translucent scattering layer 1 is formed by titanium oxide coated mica 1a which is obtained by coating titanium oxide on a base material, mica, and has a particle size of 10 to 60 μm and a binder 1b. When the shielding property is to be increased 40% or less of titanium oxide is added to the titanium oxide coated mica 1a. The translucent scattering layer 1 provides transmissivity of 55 to 80% when its average film thickness is 3 to 20 μm so that desired transmissivity when light is emitted and desired shielding property when light is not emitted are obtained.



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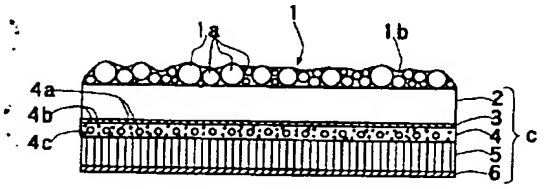
Drawing selection [Representative drawing]



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] this invention relates to the EL element for back lights.
[0002]
[Description of the Prior Art] As everyone knows, when bright in the external world, display media, such as a liquid crystal panel, can arrange a reflecting plate, can reflect the light from a front face in a tooth-back side, and can see a display. However, since it cannot see when dark in the external world, a back light is needed. Then, with the conventional technology, as shown in drawing 4 , the optical half transparency scattered plate b has been arranged at the tooth back of the display medium (liquid crystal panel) a, and EL-element c is arranged back [the]. It is made seen [the liquid crystal display], and in being dark in the external world, EL-element c is made to emit light and it enables it to have seen the display of the display medium a by making this into a back light by this by reflecting the light from the external world with the optical half transparency scattered plate b, in being bright in the external world.
[0003] It consists of what carried out the laminating of the luminous layer 44 which comes to add emitter 44a which doped the transparent-electrode layers 43, such as ITO, and zinc sulfide (ZnS) with copper at one field of the transparent-electrode base film 42, the high dielectric layer 45, and the back plate layer 46 one by one as an example of EL-element c.
[0004] By the way, since the luminescent color of the usual EL element serves as a bluish green system, it becomes that on which the screen of the penetrated type display medium a also wore the color of a bluish green system. However, generally as the screen, white is liked. Then, making pigment 44b of the pink system (refer to drawing 4) which has the complementary color relation of a bluish green color mix into a luminous layer as a means to make an EL element emit light white is performed.
[0005] However, if the pigment of a pink system is paid to a luminous layer, although the luminescent color of an EL element becomes white, at the time of un-emitting light, its screen of a display medium will be visible to the color of a pink system, and it will become a different thing from a desired color. Then, in order to stop this color, forming a white printing film in the front face of the transparent-electrode base film used as the screen, or preparing the filter of a white system is performed.
[0006]
[Problem(s) to be Solved by the Invention] Since there is only several micrometers thickness formed when preparing the filter of a white system as a means to stop the color of the pink system at the time of above un-emitting light, or when printing the ink of the white system containing titanium oxide or an aluminium powder and forming a filter, the color at the time of un-emitting light changes by change of slight thickness, and there is a problem that management of thickness is difficult.
[0007] Moreover, this thin film has the bad adhesion to PET (polyethylene terephthalate) used as the screen (transparent-electrode film) of an EL element, and when a crack etc. tends to be attached and it forms a thin film by printing etc., it is difficult [it] to obtain the high thing of smooth nature.
[0008]

[Means for Solving the Problem] In order to solve the above-mentioned problem, the EL element for back lights of this invention is formed by the titanium oxide coat mica which has the particle size of 10-60 micrometers which uses a mica as a parent for an optical half transparency scattering layer, and comes to carry out the coat of this with titanium oxide, and the thing which kneaded titanium oxide with the binder at 0 - 40% of a rate by the weight ratio if needed.
[0009] Since the work which titanium oxide reduces reflection density to a titanium oxide coat mica making dispersion nature of light high, and raises cover nature is carried out, it is easy to perform adjustment of reflection density or gray scale with the mixing ratio of a titanium oxide coat mica and titanium oxide.
[0010]
[Embodiments of the Invention] The feature is in the place whose cover of the screen of an EL element the EL element for back lights of this invention carries out the laminating of a transparent-electrode layer, a luminous layer, a dielectric layer, and the back plate layer to one field of a transparent-electrode base film one by one, the permeability of light is high at the time of luminescence of an EL element, makes reflection density small by this optical half transparency scattering layer at the time of un-emitting light by having formed the optical half transparency scattering layer of a white system in the field of another side of a transparent-electrode
[0011] An optical half transparency scattering layer consists of a titanium oxide coat mica which carried out the coat of the titanium oxide to the mica, and was made into the particle size of 10-60 micrometers, and titanium oxide added to this if needed, and it is [the addition of titanium oxide] good to form using the ink which considers as 40% or less of heavy quantitative ratios to a titanium oxide coat mica, and comes to knead a binder to this.
[0012] When average thickness is 3-20 micrometers under dryness, this optical half transparency scattering layer is set up so that the permeability of light may be 55 - 80%.
[0013]
[Example] Next, the example of this invention is explained with reference to a drawing and a table. As shown in drawing 1 , this invention consists of a thing in which the below-mentioned optical half transparency scattering layer 1 was formed to the luminescence side of the usual EL-element c. As an example of EL-element c, the laminating of following each class has been carried out to one field of the transparent-electrode film 2 which consists of a PET (polyethylene terephthalate) sheet. The 1st layer is the transparent-electrode layer 3 formed by carrying out the vacuum evaporationo of the ITO. The luminous layer 4 is formed in the 2nd layer. The luminous layer 4 is printed in the ink which kneaded what was made to distribute fluorescent substance 4a which doped copper to zinc sulfide (ZnS) in high dielectric resin binder 4b, such as a fluororesin, and added pigment 4c of a pink system, and was made. The dielectric layer 5 is formed in the 3rd layer. The dielectric layer 5 is printed in the ink which makes it come to distribute the barium titanate (TiBaO3) which is a high dielectric in a high dielectric binder. The back plate layer 6 which comes to print carbon ink is formed in the 4th layer of an outer layer.
[0014] a luminous layer 4 -- fluorescent substance 4a of a zinc sulfide (ZnS) system, and the fluororesin binder four b7:4 -- comparatively -- coming out -- mixing -- this -- pigment (SHINROIHI FA-001, tradename and product made from SHINROIHI, Inc.) 4c of a pink system -- 2.5wt(s)% -- it is formed in the ink which comes to knead what was added as the thing to which stop a pink system and the near luminescent color is made to take out white although the luminescent color by this luminous layer consists of what has comparatively strong pink -- the rate of a fluorescent substance and a fluororesin binder -- 5:3.75 -- carrying out -- the pink system pigment of the above [this] -- 2wt(s)% -- you may adopt what added, kneaded and was used as ink
[0015] Since the pigment of a pink system is added, although EL-element c presents the color of a white system with the complementary color with the color of a bluish green system at the time of luminescence, it is the color of a pink system at the time of un-emitting light. By forming the above-mentioned optical half transparency scattering layer 1 in the field of another side of this EL-element c, also in any of the time of luminescence, and a non-white light-hour, it sees from a front face, and comes to be visible to a white system.

[0016] Next, the optical half transparency scattering layer 1 is explained in detail. The optical half transparency scattering layer 1 uses a mica as a parent, and the particle size which coated the powder of this mica with titanium oxide (TiO2, Ti 2O3, etc.) is formed in titanium oxide coat mica 1a which is 10-60 micrometers of screen-stencil using the ink which added binder 1b which consists of solvents, such as a polyester system resin, an isophorone, or a tetralin, kneaded, and was made. Incidentally by this example, the thing of :(titanium oxide coat mica) (polyester system resin): (solvent) which set the ratio between 3 persons to 15:25:60 is used.

[0017] Although cover nature required to conceal the color by the side of a tooth back may be insufficient with a titanium oxide coat mica, in this case, the titanium oxide not more than 40wt% is added to a titanium oxide coat mica if needed, and reflection density is raised. Therefore, in this case, the ratio between the above-mentioned 3 persons (a titanium oxide coat mica, a polyester system resin, solvent) will call the ratio between the 3 persons of :(titanium oxide coat mica + titanium oxide) (polyester system resin): (solvent) 15:25:60.

[0018] In addition, coat ** of titanium oxide to a mica can be judged with the mixing ratio of a mica and titanium oxide. In the above-mentioned example, with inside particle size, it is made with the diameter of a granule 28wt(s)%, and the ratio of titanium oxide is made into 16wt(s)% with the diameter of a large drop 35wt(s)%.

[0019]

[Table 1]

	粒径(μm)	印刷メッシュ	反射濃度	X	Y	Z	x	y
酸化チタン10%		270	0.37	0.27	0.24	0.21	0.3726	0.3354
中粒径雲母酸化チタンコート	10~60	150	0.48	16.9	16.54	11.17	0.3788	0.3707
		270	0.50	28.48	28.63	25.16	0.3481	0.3480
小粒径雲母酸化チタンコート	5~20	150	0.39	4.33	4.19	2.16	0.4052	0.3923
		270	0.54	19.54	19.66	15.22	0.3590	0.3613
大粒径雲母酸化チタンコート	30~100	150	0.62	96.74	98.63	116.63	0.3103	0.3161
中粒径雲母酸化チタンコート／酸化チタン=87／13		150	0.46	6.08	5.79	3.84	0.3873	0.3685
中粒径雲母酸化チタンコート／酸化チタン=75／25		150	0.46	3.87	3.39	2.26	0.3941	0.3637
中粒径雲母酸化チタンコート／酸化チタン=64／36		150	0.42	1.04	0.93	0.61	0.4017	0.3609

[0020] Table 1 shows the measurement result of 3 stimulus value (X, Y, Z) of the reflection density in the particle size and the printing mesh of a titanium oxide coat mica, or a color, and a chromaticity-coordinate value (x y). Although it does not have a meaning important about X and Z among the above-mentioned 3 stimuli here, it has the property which Y value is a value at the time of making the so-called FURUKARA into gray scale, it becomes white, so that it is close to 100, and becomes so black that it is close to O. [of this] It turns out that, as for a chromaticity-coordinate value (x y), the near value of x= 0.3 and y= 0.3 is presenting white in xy chromaticity diagram shown in drawing 3 .

[0021] In order for the optical half transparency scattering layer in this invention to show the object color itself white, in order that x and y value may take out the whiteness as about 0.3, and reflection and the scattered light, respectively, enlarging Y value if possible is called for. Then, if each value of Table 1 is surveyed, in this, it can be said by the type of inside particle size that the thing of 150 meshes is the optimal in this.

[0022] In addition, it turns out that Y value is small, so that there are many additions, when titanium oxide is added to a titanium oxide coat mica. Although Y value becomes large, what has a still larger particle size of a mica is not suitable for adoption, in order that thickness may become thick too much and may make the permeability of light fall.

[0023] To be the thing which the optical half transparency scattering layer 1 makes penetrate luminescence from a luminous layer at the time of luminescence, and is made to penetrate from the tooth-back side of a penetrated type display medium (illustration abbreviation) to a front-face side further is demanded.

[0024] The relation between the dryness (dry) thickness after the optical half transparency scattering layer which printed to drawing 2 in the ink when having not added among the above-mentioned ink only in the case of a titanium oxide coat mica (i.e., titanium oxide), and was formed

in it dries, and the permeability of light is shown. Although permeability becomes small as dry thickness becomes thick so that this drawing may be seen and may be known, generally specification is satisfied as an optical half transparency scattering layer by making permeability into 55 - 80% of range, using average thickness as 3-20 micrometers. And it is desirable to make permeability into 60 - 70% of range still more preferably, using average thickness as 7-15 micrometers.

[0025] Since the particle size of titanium oxide coat mica 1a is 10-60 micrometers, although the front face of the optical half transparency scattering layer under dryness is the uneven thing about the thickness of an above-mentioned optical half transparency scattering layer here, the property is described not as the uneven maximum and the minimum value but as the value, i.e., average thickness, averaged on the whole.

[0026]

[Effect of the Invention] According to this invention, since ink with high adhesion is used to EL luminescence side, formation of an optical half transparency scattering layer is easy, and the EL element for back lights which a crack cannot attach easily can be obtained. Moreover, the screen is made into the white which stopped pink at the time of un-emitting light, and white EL luminescence of high brightness can be used as an object for back lights with high permeability at the time of luminescence.

[0027] Moreover, by forming the optical half transparency scattering layer of this invention so that average thickness may be set to 3-20 micrometers under dryness, the permeability of light becomes 55 - 80%, and the general practical use range will be offered.

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CLAIMS

[Claim(s)]

[Claim 1] The laminating of a transparent-electrode layer, a luminous layer, a dielectric layer, and the back plate layer has been carried out to one field of a transparent-electrode base film one by one. in the field of another side of the above-mentioned transparent-electrode base film The optical half transparency scattering layer of a white system is formed. the above-mentioned optical half transparency scattering layer The EL element for back lights characterized by being formed from titanium oxide of 40% or less of heavy quantitative ratios to the titanium oxide coat mica which carries out the coat of the titanium oxide to a mica, and serves as particle size of 10-60 micrometers, and the titanium oxide coat mica concerned added if needed, and the binder.

[Claim 2] The above-mentioned optical half transparency scattering layer is an EL element for back lights characterized by the permeability of light being 55 - 80% when average thickness is 3-20 micrometers under dryness in a claim 1.

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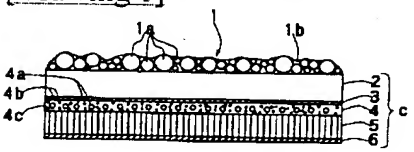
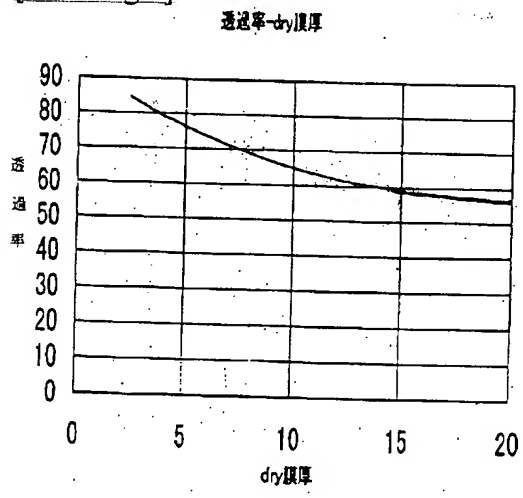
DRAWINGS

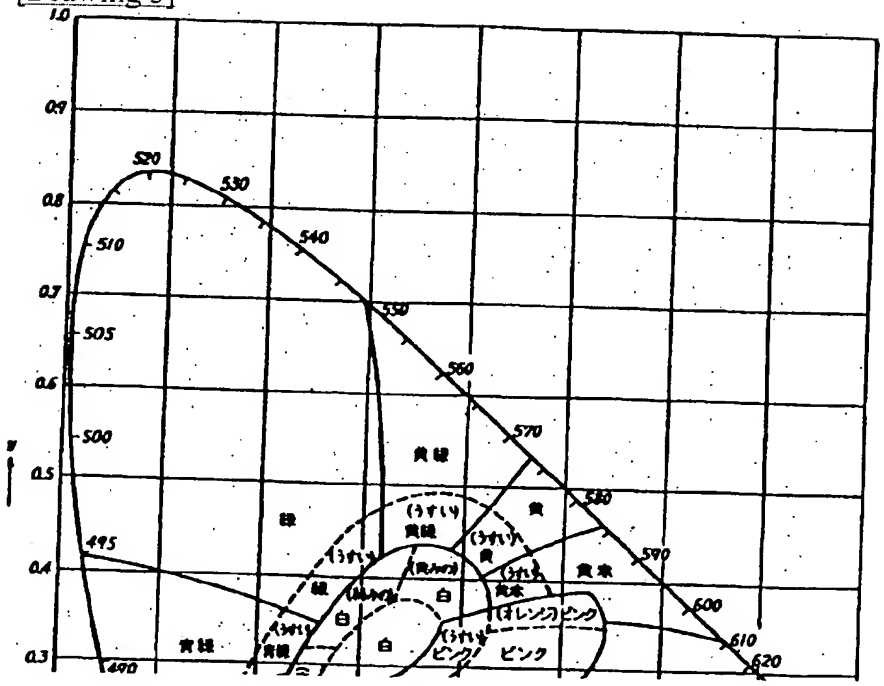
[Drawing 1]

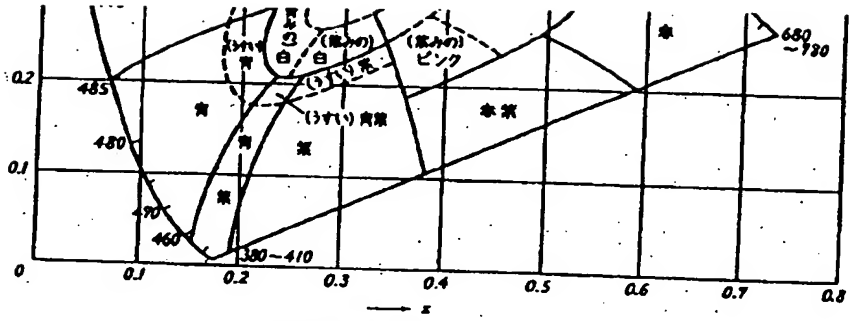


[Drawing 2]



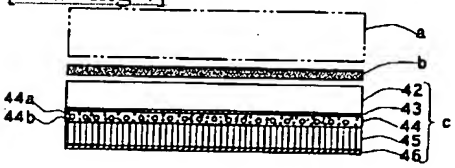
[Drawing 3]





エッ色度図の色区分.

[Drawing 4]



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